BOSTON PUBLIC LIBRARY
3 9999 06543 413 4
GOVDOC
BRA
5116

BOSTON REDEVELOPMENT AUTHORITY
Library

STAFF REPORT 7

MANAGEMENT POLICIES AFFECTING THE CAPITAL PROGRAM

prepared by
THE EXECUTIVE OFFICE OF TRANSPORTATION & CONSTRUCTION

for presentation to
THE TRANSIT DEVELOPMENT COMMITTEE
of the ADVISORY BOARD to the MBTA

WORKSHOP: MAY 6, 1976

This document has been prepared as part of the development of the Revised Program for Mass Transportation, 1976. The Staff Reports are prepared with the cooperation of the Central Transportation Planning Staff, The Massachusetts Bay Transportation Authority, and the Advisory Board to the MBTA.

T21
M38T
7

FREDERICK P. SALVUCCI
SECRETARY

The Commonwealth of Massachusetts

Executive Office of Transportation & Construction
One Ashburton Place
Boston, Massachusetts 02108

MEMORANDUM

TO: Representative James Smith, Chairman
Advisory Board Transit Development Committee

April 29, 1976

FROM: Matthew A. Coogan
Director of MBTA Systems Planning

RE: Transmittal of Staff Report #7

I am pleased to transmit Staff Report #7 - "Management Policies Affecting the Capital Program," prepared for review of the Transit Development Committee. This paper has been prepared for presentation at the Workshop to be held on Thursday, May 6, at 4:00 p.m. at the offices of CTPS, 27 School Street, Boston Mass.

The Report was prepared by the MBTA staff, with Mr. Arrigo Mongini serving as coordinator of the project. The document has received extensive in-house review at the Authority. The Staff Report represents the most up-to-date statement of the policies of the Authority management towards the capital program.

This represents the last of the ten workshops scheduled to guide the initial drafting of the 1976 Revision of the Program for Mass Transportation. The EOTC staff currently expects to have a draft of a short "Plan in English" and a longer "Technical Supplement" available for review sometime in mid-June.

I would like to express our appreciation for the continuing role being played by the Committee in this important effort.

Digitized by the Internet Archive
in 2012 with funding from
Boston Public Library

http://www.archive.org/details/managementpolici00mass

STAFF REPORT 7

MANAGEMENT POLICIES AFFECTING THE CAPITAL PROGRAM

SUMMARY

prepared by
THE EXECUTIVE OFFICE OF TRANSPORTATION & CONSTRUCTION

for presentation to
THE TRANSIT DEVELOPMENT COMMITTEE
of the ADVISORY BOARD to the MBTA

WORKSHOP: MAY 6, 1976

This document has been prepared as part of the development of the Revised Program for Mass Transportation, 1976. The Staff Reports are prepared with the cooperation of the Central Transportation Planning Staff, The Massachusetts Bay Transportation Authority, and the Advisory Board to the MBTA.

PROGRAM FOR MASS TRANSPORTATION

STAFF REPORT #7

MANAGEMENT POLICIES AFFECTING THE CAPITAL PROGRAM

SUMMARY

The MBTA is an operating agency whose primary task is to provide passenger transportation. The capital program is one of a number of instruments for accomplishing this. The primary concern of management, against which its performance can be objectively measured is to increase riders while keeping costs under control. To this end it will pursue the following goals:

- Increased riders
- Control of financial burden
- Improved quality of service
- Increased productivity
- Improved safety and security
- Equitable fares and service

In addition, as an agency of government, the MBTA will also be responsive to the following social and economic goals which transcend its role as an operating agency:

- Providing for riders with special needs
- Environmental improvement/energy conservation

- Equal opportunity
- Economic recovery
- Support desirable land use and development

A number of these goals may conflict with one another. Also the social goals may impose additional costs upon the MBTA beyond its operating responsibilities. The MBTA has adopted policies which strike a balance among the goals. These policies and their relationship to the capital program are discussed in this Staff Report. These are the most important points:

1. The capital program, in conjunction with better maintenance practices, must provide and support a fleet of attractive vehicles in sufficient numbers to attract and accommodate a one third increase in riders.

2. As part of its general responsibility for controlling the financial burden, major rapid transit extensions and other projects will be designed and operated in such a way as to minimize the future burden.

3. Since downtown oriented trips, particularly peak hour work trips, continue to be the mainstay of MBTA's market, high priority in the capital program will be given to serving this market well through providing extensions of rail rapid transit service and improvement of the commuter rail system.

4. Major attention will be given to design for more efficient work practices in the eventual use of capital projects, including consideration of providing certain services by private organizations under contract.

5. Electrical or mechanical devices incorporated in the MBTA capital program shall generally be of proven technology and maintainability either in regular service on other transit properties or after extensive in-service testing by the MBTA.

6. A major concern within the MBTA capital program will be the safety and security of passengers and employees, through compliance with building codes, upgrading to OSHA standards, special design features of major projects, and specific projects designed to improve safety and security.

7. Major improvements are possible in the pollution characteristics of the MBTA system, particularly in electric power generation. The decision to switch to purchased power as well as other pollution abatement/energy conserving features of the capital program should bring these improvements about.

8. The MBTA will take all reasonable measures in the capital program to reduce noise exposure due to public transportation and generally to provide for environmental improvement through procedures under the National Environmental Policy Act.

9. The MBTA recognizes that there are ways in which the capital program can serve important goals related to equal opportunity, economic recovery and improved land use/economic development, and will be fully responsive to these as an agency of government.

TABLE OF CONTENTS

I. Introduction 1

Management Goals 1

II. Specific Objectives and Policies Relating to the Capital Program 4

1. Increased Riders 4

1.1 Public Transportation Service Policy 4

1.2 Policy on Fleet Size and Age 5

1.3 Market Priority Policy 8

1.4 Direct Competition with the Automobile 9

2. Control of Overall Financial Burden 9

3. Improved Quality of Service 11

3.1 Interface between Transportation Modes 11

3.2 New Transit Services 12

3.3 Near Term Improvement 12

4. Unit Costs and Productivity Improvement 13

4.1 Maintenance Policy 13

4.2 Policy on Contracting Out Work 15

4.3 Decentralization of Local Service 17

4.4 Redundancy of Service 18

4.5 Policy on New Technology 18

TABLE OF CONTENTS (CONTINUED)

5. Improved Safety and Security 19

5.1 Building Codes 19

5.2 OSHA Standards 20

5.3 Specific Safety and Security-Oriented Improvements 21

5.4 Safety and Security Design Features 22

6. Equitable Fares and Service 23

7. Providing for Needs of Elderly and Handicapped 23

8. Environmental Improvement and Fuel Consumption 24

8.1 Air Pollution and Fuel Consumption Policy 24

8.2 Noise Policy 26

8.3 Policy toward Environmental Improvement in General 27

9. Equal Opportunity/Affirmative Action 27

10. Economic Recovery 28

11. Desirable Land Use and Development 28

APPENDIX A Air Quality/Energy Consumption

APPENDIX B Noise

MANAGEMENT POLICIES AFFECTING THE CAPITAL PROGRAM

I. INTRODUCTION

The MBTA is a transportation operating agency. As such, its primary concern is to increase ridership while minimizing rises in costs. This has been made explicit in the Authority's Service Policy for Surface Public Transportation.

"To achieve an annual system passenger volume of 200 million riders by 1981 with approximately the same or fewer employees."

This primary concern and the ways of supporting it are expressed in the following goals:

1. Increased Riders

   To attract additional riders which can be served at reasonable cost in relation to present costs per rider.

2. Control of Overall Financial Burden

   To bring under control the overall costs of supplying public transportation and to seek an equitable distribution of the resultant financial burden among riders and public revenue sources.

3. Improved Quality of Service

   To improve the quality of service offered, where this is possible without unreasonable increases in costs per rider.

4. Unit Costs and Productivity Improvement

   To reduce the cost of supplying a desirable level of public transportation service and to increase the level of service provided at a given expenditure level.

5. Improved Safety and Security

To reduce the hazards to which riders and employees are exposed in connection with public transportation service.

6. Equitable Fares and Service

To implement a fare structure and fare level which are equitable in terms of price per value received and to apply uniform criteria for the establishment and discontinuation of service.

The Authority's capital program is an important means of implementing this strategy. This program, along with other management tools, will enable the MBTA to meet its operating responsibilities, for which it is solely accountable. Nevertheless, the MBTA is also an agency of government. Consequently, it must serve the public in an environment shaped by society's demands as expressed through its elected officials. It should be responsive to at least the following social goals:

7. Provision for Riders with Special Needs

To provide transportation service for elderly and handicapped persons, particularly those who do not have ready access to an automobile.

8. Environmental Improvement and Fuel Consumption

To reduce air pollution, noise pollution, other forms of environmental degradation, and fuel consumption associated with supplying public transportation service.

9. Equal Opportunity/Affirmative Action

To remedy the effects of any illegal discriminatory practices in the MBTA, to eliminate such practices, and to take positive action so that the MBTA work force reflects the racial and sexual composition of the population where the jobs exist.

10. Economic Recovery

To contribute to the reduction of the unemployment rate in Massachusetts and stimulate the depressed economy through a large scale capital investment program.

11. Land Use and Development

To contribute to and facilitate the process of land use planning and development for the long term.

Management must remain flexible enough to accommodate these and other social goals. Here again, the MBTA's capital program, in both its development and implementation, is a key management tool. It is important to recognize that achievement of social goals may impose costs on the MBTA which are in excess of those associated with a strictly operating efficiency criterion. Investment of resources for social purposes produces returns, but not ones as easily identified as more riders or lower costs. Therefore, a dilemma facing the MBTA and the public will be how to share more equitably the burden of MBTA cost. Within the MBTA's control is the ability to achieve greater efficiency in both operations and construction, in order to stabilize the relationship between fare revenues and operating costs. Yet to be resolved is how the public

will choose to share in the increasing costs of the MBTA as a means for achieving social goals.

II. Specific Objectives and Policies Relating to the Capital Program

The remainder of this report contains a discussion of some specific objectives and policies under each of the overall management goals, which are related to MBTA's capital program. This is not a comprehensive list of all MBTA objectives and policies since many are not significantly related to the capital program. Indeed many of the above goals will be attained primarily through actions outside of the capital program.

1. Increased Riders

1.1 Public Transportation Service Policy

The most far reaching of the service goals stated in MBTA's Service Policy for Surface Public Transportation, adopted by the Board of Directors on January 7, 1976, was:

"To achieve an annual system passenger volume of 200 million riders by 1981 with approximately the same or fewer employees."

This would mean an increase of about one-third in the number of riders. It implies that MBTA should attract such an increase by providing better service, and that it should be able to accommodate the increase when it materializes: At the same time, it must increase productivity by producing more service with the same number of employees. These points mean several things for the capital program:

Being able to attract more riders will mean that, among other things, parts of the MBTA vehicle fleet will have to be renovated or replaced with modern attractive vehicles and transit stations will have to be made more inviting. Also, convenient service will have to be extended to a wider market. All three things are being done under the capital program.

Being able to accommodate more riders will mean that there will have to be more vehicles in service. Part of this can be done by better maintenance of the fleet but part will also have to come by expanding the fleet through new vehicle purchases. Also, where required, new or renovated facilities will be provided to support an expanded fleet.

Finally, improving productivity will mean that new support facilities, line extensions, and vehicles will have to be designed with an eye toward being able to provide more service with the same or fewer employees.

1.2 Policy on Fleet Size and Age

The MBTA recognizes that improved mechanical condition, comfort and appearance of the fleet in all transit modes will do much to make public transportation a more reliable and more pleasant, hence a more attractive means of travel. The size of the fleet and its condition are directly related to MBTA's potential for attracting and accommodating increased riders. In addition, if the fleet is in good mechanical condition, the cost of operating and maintaining

it can be reduced. The capital program can be used as one instrument to help bring this about.

An Authority staff study showed that total costs (including capital costs) are minimized when bus retirement age is between ten and fifteen years. If only local share of the expense is counted, then the least cost retirement age would be as low as six years. However, retiring buses after only six years would represent a misuse of capital resources and would displace their application to more justifiable projects. Ten to twelve years should be the practical retirement age because appearance and reliability tends to deteriorate beyond that point. In the past, as many as 300 buses were purchased in a given year, implying that a substantial portion of the fleet would have to be replaced when these reached retirement age. A more gradual replacement would minimize the number of buses reaching a given age in a given year and would thereby spread the maintenance and overhaul workload and tend to reduce personnel requirements.

The MBTA's policy then is to order further bus replacements on a uniform basis of 100 to 120 per year, ultimately reducing the retirement age of all buses to 10 or 12 years and the average age to 5 or 6 years. Maintenance practice will be improved to the point where at most 15% spares are required beyong the scheduled bus fleet. The size of the scheduled bus fleet will be dictated by <u>current</u> service needs because of the relatively short lead time associated

with bus orders.

With the MBTA's electrically powered fleet (including trackless trolley, light rail, and rapid transit vehicles), a gradual replacement policy would be impractical because, unlike buses, these vehicles are not ordered "off the shelf" and it becomes important to order as many vehicles at a time as practical. Though the maximum age of rapid transit cars is considered to be about 40 years, the Authority now has some cars over 50 years old and others of 19 years which are being considered for replacement. In practice, the case for replacement should be considered on its own merits for each set of cars.

The present condition of the MBTA's fleet has resulted in a large percentage of cars being out of service and a high rate of failure in service. This is partly caused by an inadequate program of preventive maintenance and an almost exclusive concentration on "catch up" repairs. This also affects the strategy of car replacement since newer cars tend to be more reliable.

It is the MBTA's policy to provide modern, comfortable, reliable and safe vehicles on its electrically powered lines. Major attention will be placed on maintainability of the equipment and, insofar as possible, on compatability of replacement parts with other vehicles of the fleet, including

those on different lines. This will be accomplished by a combination of improved maintenance practices, rehabilitation of existing equipment, and purchase of new vehicles. Every option will be evaluated with regard to its costs and effectiveness in achieving this policy.

The size of new rapid transit and streetcar orders will be dictated by future schedule requirements to accommodate projected peak hourly flows with an allowance of 2½ square feet of space per standing passenger past the peak load point, averaged over the full hour. The projections will be for a period in the forseeable future, taking into account economic, social and land use factors as estimated by CTPS and transportation policies, as developed by EOTC, and allowing for the goal of increased ridership as expressed in the Service Policy.

1.3 Market Priorities Policy

It is clear that the market where public transportation has the greatest advantage continues to be the downtown oriented work trip and other downtown trips. As pointed out in earlier PMT Staff Reports, the Boston region has been and continues to be centrally oriented in terms of transportation demand. The MBTA will put major emphasis on continuing to serve this market well. The capital program clearly reflects this priority in its emphasis on suburban extensions of rapid transit service and the improvement of commuter rail service.

In addition, the MBTA will seek ways of serving new markets through service experiments, various types of market research, and other less capital intensive means.

1.4 Direct Competition with the Automobile

Another dimension of the MBTA's policy for increasing ridership is direct competition with the use of automobiles for trips which can effectively be served by public transportation. While not under its direct control, MBTA mangement will nevertheless support policies for discouraging use of the automobile during peak periods and for downtown oriented trips and particularly where it interferes with transit operations. In some cases, the MBTA has linked this policy with the capital program, such as in requiring that upgrading of streetcar service be accompanied by local action to install appropriate traffic control devices and enforcement of parking violations.

2. Control of Overall Financial Burden

The MBTA is one of the highest cost operators of public transportation in the United States. In addition, fare revenues cover only about 30 percent of operating expenses, not counting debt service. If debt service is counted, the figure is closer to 25 percent. If the only major management goal were the reduction of losses, then a logical policy would be not only to stop building extensions of rapid transit service but also to contract drastically existing service and to raise fare levels accordingly - with profound effects on the capital program.

However, this is clearly not a viable policy since there are other management goals as well as public policy goals outside the context of MBTA management that should be pursued, not the least of which is stimulating a badly depressed regional and State economy.

MBTA management sees its responsibility rather as bringing under control the overall costs of supplying public transportation and seeking an equitable distribution of the financial burden among riders and tax sources. This will be accomplished by a variety of means, most of which are outside the capital program. However, a major effect on the capital program is that management will insist on consideration in depth of the operating and maintenance implications of extensions of service and other capital investments with an eye toward minimizing the financial burden.

A final policy relating to the goal of controlling and equitably distributing the financial burden is that of maximizing revenue obtainable from rentable or leasable property incidental to providing public transportation. With regard to the capital program, this means the MBTA will take advantage of opportunities for joint development in conjunction with new rapid transit stations or station modernization work. Where it is both profitable to the MBTA and convenient to passengers, where it does not impede transportation operations or passenger flow, where it is consistent with good design and land use practice, and where it is consistent with guidelines of the Federal

Government for use of grant funds, the MBTA will include space and/or other features in its design of stations or other facilities that can accommodate appropriate joint development.

3. Improved Quality of Service

3.1 Interface between Transportation Modes

One of the main problems which public transportation has in competing with the automobile is that an automobile can go practically anywhere, while conventional transit is limited to a fixed route. One way of alleviating this problem is to make it as easy as possible to transfer between routes and to use public transportation in conjunction with the automobile. This means two things for the capital program:

Every effort will be made to improve the connections in the public transportation system by seeing to it that new rapid transit stations are designed to accommodate feeder bus service and that rapid transit and commuter rail stations are made to interconnect better.

Fringe parking and "kiss and ride" space will be provided to the extent that this is consistent with the projected character of the neighborhood and where there is a proven demand (such as at stations near the ends of rapid transit lines).

3.2 New Transit Services

The introduction of public transportation services different from the conventional services offered by the MBTA has very little effect on the capital program and will not be discussed at length here. These services could include dial-a-ride, specialized services for the elderly and handicapped, circumferential services (between outer suburbs), neighborhood or intra-town local bus services, etc. A comprehensive policy toward these is still in the developmental/experimental stages. However, one component of such a policy has already been stated in section 6.2.3 of the Service Policy for Surface Public Transportation. That section establishes that one criterion for the award of a contract to operate a new service to a private organization be its cost/effectiveness in relation to that of the MBTA. This affects the capital program in the following sense: If the new service is provided by the MBTA, then the vehicle requirements will have to be provided for in the capital program. If not, the private operator is likely to provide his own vehicles.

3.3 Near Term Improvement

Both in providing service improvements and in improving productivity, the MBTA prefers to pursue a mix of actions, including capital projects, which will result in tangible results materializing in the near term as well as the long term. The logic of this is that the public can tolerate

promises only so long and should legitimately expect management to produce results. This implies that capital investments should not have an exclusive orientation to major new lines or even new shops but rather should also include renovation of stations, new or rehabilitated vehicles and similar projects which produce early results.

4. Unit Costs and Productivity Improvement

4.1 Maintenance Policy

The MBTA recognizes that considerable improvement is needed in the general condition of its existing plant and vehicle fleet and in the cost of maintaining these in serviceable condition. This is not a problem that can be solved by setting idealized standards for this condition or by simply devoting more resources to the maintenance function. It is rather a problem of increasing the output for a given level of maintenance resources and of organizing the work so that this improvement actually takes place. The MBTA has the following objectives aimed at improving maintenance output:

- Train the work force and improve the quality of management toward maintaining existing equipment and the new equipment now on order in a systematic way.
- Develop better information systems to detect problems needing maintenance attention and to forecast workloads.

- Set reasonable goals for the gradual improvement of specific service conditions that depend on maintenance, such as number of cars available for service.
- Assure that major new investments do not in themselves lead to maintenance problems.
- Tighten up on spare vehicles in order to reduce the tendency to rely on spares as an alternative to preventive maintenance practices.
- Provide modern diagnostic and repair equipment.
- Provide modern facilities to house the maintenance operation.

The principal ways in which the MBTA's maintenance objectives affect the capital program are in their implications for new diagnostic and repair equipment and new maintenance facilities. In this regard, careful attention will be given to the design of the facility and the equipment to encourage efficient work practices. Where there are alternatives which may break with present work practices and yet which improve efficiency, it will be the Authority's policy to adopt such alternative designs.

In some cases, this policy may cause a problem where the present work practice is codified in terms of a work rule in a labor contract or where it is an interjurisdictional union issue. If the work practice is not eliminated in negotiations or arbitration, then the new design could result in some inefficiency or in an unwarranted capital expenditure. For example, there is a current operating practice wherein a bus operator will not drive his vehicle into or out of a bus storage

garage.

This is left up to the mechanics assigned to the garage. This results not only in extra personnel requirements but also in the creation of large, land consuming, "staging areas" adjacent to new garages. If the staging areas were not provided for and the practice left unchanged, then the surrounding street system could end up being used as a staging area, resulting in traffic congestion and other problems.

In the future, it will be the MBTA's policy to reach agreement on such issues before the design is frozen.

4.2 Policy on Contracting Out Work

The recently announced policy on surface transportation service deals with the Authority's policy toward private operators of public transportation service. In some cases, it is to the Authority's advantage to contract out certain support functions for transportation and not the entire service. For example, it may be to the MBTA's advantage to contract out the rebuilding of traction motors, the overhaul of diesel bus engines, or conceivably even the entire inspection and repair function for parts of the bus fleet. It is the Authority's policy to review periodically the costs of performing these support functions in-house as against the costs of contracting out, and to select the alternative which represents the least cost in the long run. The principal way in which this policy affects

the capital program is in the design or renovation of new support facilities which would accommodate activities which could in the future be carried out in whole or in part by the private sector. It is the Authority's policy in future planning for such facilities to evaluate as accurately as possible the extent to which the activities will most appropriately be carried out in-house or by the private sector in the long run. In conducting such an evaluation, the Authority will consider the following:

- The capital cost of the facility itself.
- The need for some in-house capability or backup in order to respond to emergency support needs or needs for which no long-term private supply can be guaranteed.
- The feasibility of maintaining competitive private sector suppliers of the support services.
- Cost comparisons - in-house vs. under contract from recent experience and the experience of other transit properties.
- Quality of work comparisons - in-house vs. under contract from recent experience and the experience of other transit properties.

4.3 Decentralization of Local Service

As already noted in the discussion of new transit services, one of the criteria governing whether new services should be provided by the private sector is cost/effectiveness. At present, the MBTA does not contemplate large scale decentralization of its regular surface routes within the MBTA district either by turning them over to private operators or to local community sponsored organizations unless it can be demonstrated that doing so would result in significant decreases in system-wide operating costs. The criteria under which transfer to a private organization could occur are covered in Section 6.2.2 of the Service Policy for Surface Public Transportation. These include impacts on total cost, capability of the private organization, and impacts on the working conditions of existing transit employees as well as a provision that the private organization be willing to operate the service free of subsidy for at least 6 months.

The MBTA's policy in this regard is to pursue other ways of reducing the cost of local service by more efficient operating practices, a gradual sorting out of services which have no hope of meeting the economic/social/environmental standards enumerated in Section 4.3 of the Service Policy for Surface Public Transportation, and bringing wages into line with those of employees with similar responsibilities in private and other public sector organizations.

If these efforts should fail and a policy of decentralization is found to be feasible and effective its direct effects on the capital program would be to reduce the size of the bus fleet under MBTA control and therefore the size of annual bus replacement orders. In addition, it would reduce the required support facilities for this fleet. Undoubtedly, these reduced capital requirements would be offset by increased requirements on local organizations which might take over the bus routes.

4.4 Redundancy of Service

One of the efficiency objectives listed in the Service Policy for Surface Public Transportation (Section 3.2.4) is to minimize the operation of redundant or competitive services. The policy of the MBTA will be to look for ways to eliminate such redundancies if they result in reductions in total cost for substantially the same service. The net result of this could be the reduction of vehicle requirements or the shifting of vehicle requirements from one mode to another.

4.5 Policy on New Technology

The MBTA will exercise particular caution in design specifications for technological improvements in new or modernized vehicles or in other new machinery. Any such improvement shall generally be of proven technology and maintainability. Any device which utilizes a technology which has not given proven results in regular service

will require in-service testing by the Authority over a sufficient period on a prototype basis before extensive use of the device is committed.

5. Improved Safety and Security

Safety is one of the features of public transportation which provides justification for a policy toward increased reliance on this mode of travel instead of the private automobile. It is a feature which the MBTA seeks to enhance, partly through operating practice and partly through the capital program. Safety standards affect the capital program in the following principal ways:

- Building Codes
- Standards of the Occupational Safety and Health Administration (OSHA) for industrial employee safety
- Capital improvements specifically designed to improve passenger safety and security
- Design features in large capital projects to promote safety and security

5.1 Building Codes

In the past, the MBTA has not been required by law to conform to local building codes in its construction programs. Recently the new Massachusetts Building Code has become law, and the MBTA is now required to conform to that code, though this is apparently still subject to legal interpretation. Even in the past, it was in fact the MBTA's policy to conform to codes. This will continue to be the case in the future.

Conformance to codes definitely has an effect on the capital program since it affects total construction cost, particularly for facilities such as garages and shops, where diesel fuel is used in enclosed areas and where consequently fireproofing standards are more severe. Building codes apply to renovation of facilities as well as entirely new facilities (typically, where the value of new construction exceeds certain percentages of the value of the facility before renovation). Because of the age of the MBTA's facilities, it is very often just as expensive to renovate facilities to satisfy the code as it is to build entirely new facilities. In some respects, this feature discourages any sizeable renovation since it would typically have to have additional project elements necessary to conform with codes though not necessary for accomplishing the basic purpose of the renovation. The choice is often between very minor improvements or a completely new facility.

5.2 OSHA Standards

As a public agency, the MBTA is not formally covered by OSHA, though it has been the policy for several years now to endeavor to conform to OSHA standards for working conditions insofar as this is possible within constraints of the budget.

Working conditions at some garages and shops are substandard while at the new facilities they incorporate the latest in safety features and provide a healthy working environment. The capital program, particularly the plant improvement program, can incorporate and has incorporated, specific projects to improve working conditions and provide better employee facilities. As already noted in the discussion of building codes, it is often not economical to provide a totally adequate environment at some locations without building an entirely new facility.

It is the MBTA's policy to provide a safe healthy working environment for its employees and to devote part of the capital program to the improvement of working conditions. Priority will be given first to situations involving clear safety and health hazards, second to conditions where significant improvements in productivity appear possible, and finally to other improvements in working conditions.

5.3 Specific Safety and Security - Oriented Capital Improvements

It is the MBTA's policy to maintain the high standard of passenger safety inherent in the operation of public transportation systems by continual review of operating procedures and emergency plans, identification of potential hazards, and where necessary, the correction of such hazards with specific safety oriented capital improvements.

Examples of such improvements include tunnel ventilation projects, A. C. lighting systems in tunnels, dry standpipe mains for tunnel water supply and fire protection equipment.

It is also the MBTA's policy to make the public transportation system less subject to crime for both passengers and employees. Adequate police protection and operating procedures sensitive to crime prevention are of course extremely important but here too the capital program can be of use, as for example in the installation of bullet-proof collector booths in the rapid transit system and the improvement of station lighting.

5.4 Safety and Security Design Features

It is the MBTA's policy to give specific attention to design details which promote a safe and secure operating environment in connection with major projects. For example, full compliance with OSHA standards and building codes provides some assurance of safety in new garages, shops and yards; special attention to lighting and the elimination of blind spots and areas remote from operating personnel in connection with station modernization and new stations will tend to promote a more secure environment; better communications systems built into new stations and vehicles results in better response capabilities to safety emergencies and more effective crime prevention.

6. Equitable Fares and Service

A fare system based on distance and quality of service is probably the most equitable in the long run for the MBTA region particularly when additional rapid transit extensions are completed. It is also the most difficult to implement in a logistical sense and would require more sophisticated forms of fare collection equipment. Automatic fare collection equipment is not now a part of the capital program; but should a decision be made to implement a significantly more complicated fare system, fare collection equipment adequate for that purpose would have to be included. Such a fare structure may also affect indirectly the capital program since it could result in a shift of passengers from one mode of public transportation to another and consequently some shift in emphasis in capital investment.

The Surface Transportation Service Policy provides for an objective mechanism for making changes in public transportation service on the basis of riders, costs and social factors. This would then indirectly affect the capital program in terms of any changes in the surface fleet requirements that could emerge from restructuring surface routes and service frequencies.

7. Providing for Needs of the Elderly and Handicapped

The transportation needs of elderly and handicapped persons were the subject of PMT Staff Report 4b. Both short term and long term MBTA actions and options in relation to these needs were identified in that report. The major ways in which MBTA policies in this regard affect the capital program are in requirements

for special equipment on vehicles and stations. In particular, equipping buses with "kneelers" was the result of concerns for the elderly and handicapped. More importantly in terms of capital expense, the installation of elevators at new or modernized stations is a response to these needs.

As pointed in Staff Report 4b, there are several basic long term options for satisfying the needs of the elderly and handicapped each with significantly different potential impacts on the capital program. These include (in decreasing order of impact on capital expenditures) providing 100% accessability on the existing system by equipping all vehicles and stations with special devices, providing partial accessability at stations only, providing special services operated by the MBTA, and providing special services under contract to the MBTA, or some combination thereof. A study is now underway of which policy is most appropriate.

8. Environmental Improvement and Fuel Consumption

8.1 Air Pollution and Fuel Consumption Policy

It is not possible to make a general recommendation for the promotion of one transit mode over another on the basis of air quality considerations alone. This is because no transit mode has the lowest pollutants per vehicle mile in all categories of emissions. At the same time, transit modes are almost always wuperior to the private automobile. Therefore, a general policy of promoting mass transportation is beneficial with respect to air quality.

Pollution characteristics of the public transportation modes are closely related to energy consumption. An improvement in energy efficiency will generally lead to less pollution. The levels of energy consumption for transit sub-modes at the MBTA differ greatly from typical levels for transit in the United States. This is particularly true for rapid transit where the data seem to indicate that the present power generation and delivery system is grossly inefficient in terms of fuel per car mile, in relation to a typical rapid transit operation.

It is the MBTA's policy to reduce the pollution generating characteristics of its system by renewal and replacement of its existing power distribution system and of its buses, trolleys, and diesel rail engines. It is the MBTA's policy to improve pollution abatement at its existing power source, to reduce energy consumption and pollution levels by switching to a more efficient privately supplied source of electric power, and by reducing as much as possible pollution/energy intensive practices such as running bus engines overnight. Federal requirements for planning certification and for capital assistance also provide assurance that air quality is considered in MBTA planning and management.

Pollution and energy consumption considerations are partly responsible for the power system improvements in the capital program, for immersion heaters used with buses stored outdoors, and for indoor storage in new bus garages.

See Appendix A for details on air pollution/energy.

8.2 Noise Policy

The MBTA takes all reasonable design measures to reduce noise effects, particularly in areas adjacent to residential areas and in areas of high employment density. All reasonable measures are taken to design vehicles and stations to reduce noise effects. Technological improvements in vehicle and in roadbed design permit the MBTA to provide quieter service than was offered in the past.

Full advantage is taken of these improvements. For example, the MBTA has included upper limits on interior and exterior noise in the design specifications for the new Orange Line cars and the new Light Rail Vehicles. These limits are 65 dBA interior noise and 80 dBA wayside noise at 50 ft. for both of these vehicles, a considerable improvement over those being replaced. As another example, the removal of the elevated structure used by the Orange Line has taken place on the segment north of Boston and is being proposed in the Southwest Corridor. One of the benefits of this project is the reduction of noise impacts.

See Appendix B for details on noise

8.3 Policy Toward Environmental Improvement in General

The MBTA is of course design conscious with respect to environmental effects other than air and noise pollution. Esthetics for example is an important consideration in the location and design of transit routes and stations. Special systems are installed at new shops for the disposal of materials such as solvents, greases, and waste products so as to minimize adverse impacts.

Generally, the requirements of the National Environmental Policy Act and the Massachusetts environmental statute assure that the environmental impacts of any capital investment are given close scrutiny and public review before construction is approved and that environmental considerations are given great weight in the final engineering/design process.

9. Equal Opportunity/Affirmative Action

The MBTA's recently announced policy on equal opportunity/ affirmative action does not have an effect on the nature of the capital investments undertaken by the MBTA. Its effects are on the procedures used in contracting and hiring of personnel in the administration of the program and are therefore not the subject of this staff report.

10. Economic Recovery , and

11. Land Use/Economic Development

MBTA management does not view itself as an agency whose primary concern is either general economic recovery or the promotion of better land use and economic development of depressed areas. Management recognizes that these are important goals of government and goals where the MBTA capital program has an important role to play. Management is therefore devoting considerable effort in expediting its major construction projects in order to put people to work and is developing design concepts which will encourage land use and economic development appropriate to the community in which the project is located.

One specific point which concerns facilitating future development involves MBTA policy toward the acquisition of rail rights-of-way.

The rights-of-way of railroads located in the Boston region are uniquely suited to future use as ready made exclusive rights-of-way for public transportation services. It would be practically impossible to assemble a parcel of land so suited by means other than acquisition of these rights-of-way. Not to acquire them would allow parts of them to fall into other uses and lose the continuity of the land for transportation.

It is the MBTA's policy to acquire railroad rights-of-way in the Boston region where these are available for sale and where they could conceivably be used for providing future transportation services even though such use may not at the present time be justified. This policy is directed primarily at contributing to orderly land use and development in the long term.

NOTE: APPENDIXES

A AND B AS BEFORE

APPENDIX A

Air Quality and Energy Consumption

1. Factors Influencing Energy Consumption and Air Quality

An efficient transit system results in significantly lower energy consumption levels and significantly less air pollution on a passenger mile basis than the private automobile. The pollution characteristics of any transit mode (as measured in grams per vehicle mile) vary according to a number of factors. These factors include operating conditions, vehicle age, power plant age, and equipment and trackage maintenance policies. The pollution characteristics for each mode are so sensitive to these factors that no general recommendation can be made regarding which mode is superior from an air quality standpoint.

Table I compares pollution characteristics in terms of pollutants per vehicle mile for a typical rapid transit operation and for a typical bus operation. The pollution levels for rapid transit and for bus were both determined by making assumptions that do not necessarily apply to MBTA operations. Part of the present system at the MBTA results in much more pollution than would be necessary under an efficient operation. Some of this inefficiency is directly traceable to the condition of the existing plant and vehicles, and part of it can be remedied through the capital program.

The pollution characteristics for an auto operated in this region are also presented in Table I. On the basis of pollution per vehicle-mile, neither auto nor the transit modes has the lowest pollutant levels in all categories. Auto has the highest carbon

monoxide levels. Bus has the highest hydrocarbon levels. Oxides of nitrogen and of sulfur for rapid transit exceed levels for bus or auto.

The transit modes have much higher capacity and greater occupancy levels than auto has. Table II compares pollution levels for auto, bus, and rapid transit as measured in grams of pollutant per passenger mile. During the rush hour, auto clearly has the highest pollutant levels. Rapid transit has the lowest pollutant levels during this time of day.

Occupancy levels for bus and rapid transit during the mid-day and evening periods may differ a great deal from peak period levels. Bus pollutant levels, at these times, could be less than levels for rapid transit for some categories of pollutants. During mid-day and evening periods, auto would usually have the highest pollutant levels.

It is worth restating that the pollution characteristics of bus and rapid transit are so sensive to a variety of factors that no generalization can be made regarding which mode is superior. These factors also influence the level of fuel consumption for bus and rapid transit. The fuel consumption level for MBTA rapid transit is higher than typical levels. A typical electric rail rapid transit system will consume energy at the rate of 2.7 to 3.0 miles per gallon of fuel oil. Energy consumption at the MBTA is 0.7 to 0.9 miles per gallon. The reasons for this disparity are outlined later in this appendix. The high levels of energy consumption by MBTA rapid transit suggests also that pollutant levels

by MBTA rapid transit are in excess of levels presented in Table II.

These very high levels of fuel consumption in relation to typical systems suggest there is much that should be done to improve energy efficiency.

2. MBTA Programs Underway that Improve Air Quality and Energy Consumption

The electric power generation and distribution system for the MBTA is grossly inefficient in terms of fuel consumption per unit of energy delivered to the electric vehicles. The power system does not have adequate pollution abatement capabilities (precipitation) at the power plants. In the short run, the immediate needs power source improvement project now underway will lead to more efficient power generation and to improved air quality levels. In the longer run, the MBTA's decision to rely on an electric utility for its bulk power source further improves air quality levels. This is because the utilities tend to generate power from larger and more efficient units than those used presently by the MBTA. In particular, it is estimated that at least 24,000 BTU of fuel oil are required for every kilowatt-hour (KWH) produced at the MBTA's power plants, while Boston Edison uses only about 10,000 BTU/KWH in its steam generation plants. The program to renew the entire system of power substations and to replace cable will result in further improvements to air quality and energy consumption.

It is the Authority's policy to replace buses on a regular basis and to remove buses of over twelve years of age from the fleet. This replacement policy will result in the introduction of a larger share of newer buses, which conform to stricter air quality standards, into the MBTA fleet. These buses also are more efficient in terms of fuel consumption because of improved design.

The replacement in kind of the trackless trolley fleet is currently underway. The implementation of this project was partly the result of air quality considerations. One element of the commuter rail improvement program (C.R.I.P.) is to replace the diesel engines on the Budd car fleet. The implementation of this element of the C.R.I.P. will improve air quality.

Another program recently implemented is the installation of immersion heaters where buses are stored outdoors. The immersion heater is a device which electrically heats the engine oil, hence the engine block, when connected to a bus parked outdoors. This obviates the need for all night running of bus engines during very cold weather to assure early morning starts. The immersion heater thus results in considerable reduction in air pollution and in fuel savings. New bus garages result in additional fuel savings since additional indoor storage capacity would eliminate even more night time running of buses than with immersion heaters.

TABLE I

Comparison of Pollution Levels for Typical Rapid Transit and Bus Services and for Automobile (in Grams per Vehicle Mile)

Pollutant	Rapid Transit [1]	Bus [2]	Auto [3]
Carbon Monoxide (CO)	.0068	10.9	37.21
Hydrocarbon (HD)	.5443	14.7	5.67
Oxides of Nitrogen (NO_x)	17.69	13.8	3.64
Oxides of Sulfur (SO_x)	13.61	----	.13
Aldehydes	.1043	----	----
Particulates	1.724	----	.40

[1] This assumes 5.3 HwHr/car-mile and use of oil (a combination of fuel oil and furnace oil) in electrical power generation. the age of the power generating facility and the efficiency of the distribution system have a great influence on the level of pollutant per car-mile. For this reason, MBTA pollutant levels differ from the typical values.

[2] This assumes operation of 1973 diesel powered 50 passenger buses. The buses are assumed to operate at a variety of speeds that are typical for service to urban and suburban areas. Fuel consumption rate of 4.8 miles per gallon was assumed. This rate is significantly lower than the fuel consumption rate for MBTA buses (3.3 miles per gallon).

[3] This assumes operation of a typical auto in the Boston area in 1977. Average speed of 19.6 miles per hour.

Sources: Urban Mass Transportation Authority, "Characteristics at Urban Transportation Systems," May 1974 (NTIS #PB233580)

U.S. Environmental Protection Agency, "Compilation of Air Pollution Emission Factors," 5th Supplement - AP4Z.

TABLE II

Comparison of Pollutants for Rapid Transit, Bus, and Auto (in Grams per passenger-Mile)
Rush Hour

	Rapid Transit [1]	Bus [2]	Auto [3]
Riders per Vehicle	160	50	1.2
Pollutant:			
Carbon Monoxide (CO)	.00004	.218	31.0
Hydrocarbon (HC)	.0034	.294	4.68
Oxides of Nitrogen (NO_X)	.1100	.276	3.03
Oxides of Sulfer (SO_X)	.0852	----	.11
Aldehydes	.0006	----	----
Particulates	.0108	----	.33

[1] This allows about 2.5 square feet per standee on a typical rapid transit car. Actual vehicle occupancies are often higher during the rush hour in Boston.

[2] This allows for a vehicle occupancy that is typical for an MBTA bus during the peak hour.

[3] This assumes an auto occupancy typical for an auto in this region during the peak hour. A speed of about 20 miles per hour was assumed.

APPENDIX B

Noise

1. Methods of Regulating Noise Impacts

Changes in the operation of transit systems and the introduction of new transit services can result in noise impacts on riders and on persons in communities near the transit system. Noise can be regulated by two procedures. Standards can be set on sources to reduce noise impacts. For example, the noise output of a transit car operating at grade at a specified speed as measured at a specified distance from the centerline of the track can be limited through regulations.

Another means to regulate noise is to place restrictions on the noise levels in areas adjacent to a transit right-of-way. These restrictions can vary in their severity according to the activity taking place in the area. For example, stricter standards could be placed on transit adjacent to residential areas than on transit adjacent to industrial areas. This second procedure to regulate noise can be achieved through restrictions on absolute noise levels or restrictions on the change in noise levels attributed to the new transit service.

The first method of regulating noise is most relevant in influencing decisions related to the design of transit vehicles. A vehicle manufacturer will fabricate the new vehicles to meet the MBTA's specifications. As a new transit vehicle is tested at the manufacturer, noise is measured, and the vehicle may be modified

to meet the standards. The second method is most relevant in influencing decisions related to the transit right-of-way. What alignment a right-of-way should take, whether the right-of-way should be depressed, and whether noise barriers should be erected are questions addressed by the second method of regulating noise.

2. MBTA Policy on Noise

In designing new transit extensions and in acquiring equipment for new and existing transit lines, the MBTA is sensitive to noise pollution effects. No specific federal, state, or local noise standards applicable to the MBTA presently exist. The U. S. Environmental Protection Agency has guidelines for noise sources. These guidelines are now in draft form. They employ the first method of regulating noise.

The Institute for Rapid Transit has developed guidelines for acceptable noise levels from train and rapid transit pass-bys. These standards do not have the effect of law. The guidelines employ the second method for controlling noise impacts. Table III presents the standards and illustrates a reference noise level.

The MBTA must follow UMTA procedural guidelines (D.O.T. Order 5610.1B) for the preparation of a Draft Environmental Impact Assessment in order to receive federal assistance for major capital projects. These guidelines provide for the identification of noise characteristics associated with the alternatives considered in the E.I.A. process.

TABLE III

Institute for Rapid Transit Guidelines

Criteria for the Maximum Pass-By Noise
Above Ground Metro Train Operations

Community Area Category	Maximum Single Events Pass-By Noise Level Criterion	Familiar Sounds of Same Magnitude
I Quiet Residential	70 dB(A)	Normal speech at 2-3 ft
II Average Urban Residential	75 dB(A)	Phone ring at 5 ft.
III Semi-Residential/Commercial	80 dB(A)	-----
IV Commercial	85 dB(A)	Diesel Truck at 50 ft.
V Industrial and Highway Corridor	85-90 dB(A)	Snowmobile

These criteria are to be applied at a point about 50 feet from the track centerlines. In some cases, particularly in residential areas, where buildings or occupied areas are farther from the transit line, the criteria may be referended to the building or area being considered. The criteria are used with caution in areas where the transit line is adjacent to schools, radio and TV studios, theaters, amphitheaters, churches and auditoriums. Maximum noise levels at such locations should not exceed 70 to 75 dB(A) outside the building regardless of the type area in which it has been categorized.

T21 M38T 7
Mass. Exec. Office of Trans-
portation & Construction.
Management policies affect-
ing the capital program.